修士論文要旨

Influence of avoidance behavior on modification of memory using reconsolidation

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Introduction

The fear response in patients with anxiety disorder can be explained by the fear conditioning paradigm. A neutral conditioned stimulus (CS) causes a conditioned response (CR) after the CS is repeatedly paired with an aversive unconditioned stimulus (US). The CS-US association is encoded as a memory trace. The conditioned fear response often recovers spontaneously even after the extinction learning. Several studies have revealed that the return of fear is prevented when extinction training is conducted following the retrieval of fear memory. Post-retrieval extinction training is related to the modification of memory during reconsolidation, rather than the establishment of extinction learning. After a consolidated memory trace is reactivated, it is destabilized and stabilized again through reconsolidation. Providing new information during reconsolidation can modify or update the original memory.

Study 1

Purpose

I propose that avoidance behavior is a relevant factor that prevents subjects from obtaining new safety information during reconsolidation. The aim of study 1 was to examine whether avoidance behavior during post-retrieval extinction training prevents the modification of fear memory.

Method

A within-subject design was used, consisting of a 3-day experiment. On day 1, ACS+ was paired with AUS, and CCS+ was paired with CUS. ACS+ and CCS+ were presented at the retrieval phase on day 2 to reactivate the CS-US associations. Instructions on how to avoid AUS were given 10 minutes after retrieval phase. The participants underwent extinction after being given the instructions. Participants underwent re-extinction on day 3. Skin potential response (SPR) was measured to assess the fear response to CSs.

Result and Discussion

Post-retrieval extinction training without avoidance behavior reduced the fear response to CS and prevented the spontaneous recovery of fear in the current study. Under the condition of post-retrieval extinction training with avoidance behavior, the fear response was not reduced as much as the condition without avoidance. It is possible that avoidance behavior prevents the modification of fear memory during reconsolidation, and the fear response to CS remains.

Study 2

Purpose

It is believed that reconsolidation is only initiated when updated information is acquired during retrieval. Thus, I predicted that avoidance during the retrieval of fear memory also prevents human subjects from obtaining new safety information, and therefore the reconsolidation process is not initiated. The aim of study 2 was to examine whether avoidance during the retrieval of fear memory prevents the modification of that memory.

Method

A mixed factor design was used, consisting of a 3-day experiment. On day 1, CSp+ was paired with USp, and CSe+ was paired with USe. CSp+ was presented at the retrieval phase on day 2 to reactivate the CSp+-USp association. Participants belonging to the avoidance group were instructed to press the enter-key to avoid the sound presentation during the retrieval phase. The participants underwent extinction after the retrieval phase. Participants underwent re-extinction on day 3. Skin conductance response (SCR) was measured to assess the fear response to CSs.

Result and Discussion

The results did not show any difference in the type of change observed in SCR between the avoidance and the control groups. In addition, this research did not replicate the reduction of fear by post-retrieval and standard extinction training in both groups. Future studies should use a more appropriate paradigm for learning fear to test the hypothesis again.